

Review the information at the following website. In your Journal, provide definitions to the following terms, and provided sketches as needed.

<http://image.gsfc.nasa.gov/poetry/educator/students.html>

Magnetosphere

Bow Shock

Magnetopause

Magnetotail

Auroral Oval

Field-Aligned Current

Ring Current

Aurora

Coronal Mass Ejection

Plasma

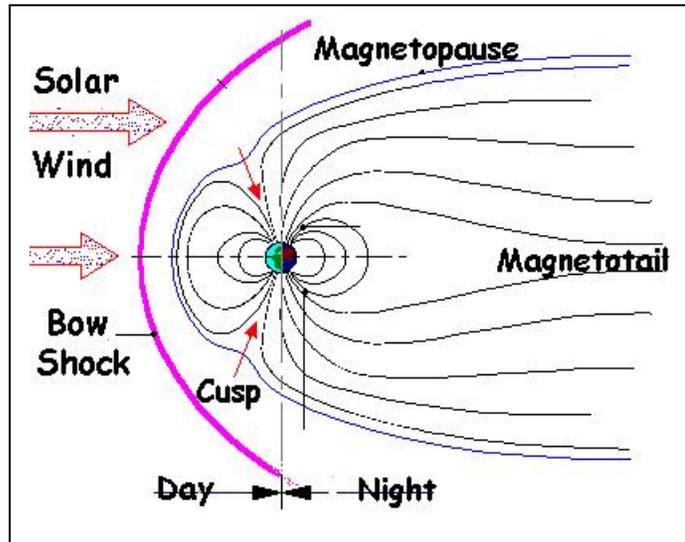
Magnetometer

Now, write a 500-word essay that describes the process that causes an aurora. Try to include as many of the above terms as possible.

Extra Credit Problem

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Scientists recognize over two dozen distinct regions and processes occurring within the Earth's magnetosphere. Some are nearly permanent features, while others appear and disappear within minutes or hours. In this activity, students will visit a NASA website and learn about the main features of the magnetosphere and how the sun-earth system functions.



The student essay on aurora might be something like the following:

When a solar storm erupts on the sun, particles of matter flow out into space and arrive at Earth. The most severe of these storms are called Coronal Mass Ejections. This material consists of charged particles that form a plasma. When this plasma collides with Earth's magnetosphere, it produces a bow shock on the side of Earth facing the sun. The plasma pushes-in the magnetopause, and causes Earth's magnetotail to change its shape like taffy being pulled. This causes energy to be stored in the magnetic fields in the magnetotail until this system reaches a breaking point. The magnetic field 'snaps' and some of the stored energy is converted into kinetic energy among the particles that make up the magnetotail plasma. These particles flow along the magnetic field lines into the Polar Regions in field-aligned currents. When these currents enter Earth's atmosphere they collide with atoms of oxygen and nitrogen. These atoms give off specific colors of light, which we see in the aurora borealis and the aurora australis. As seen from space, these aurora look like rings of light called the auroral ovals, which encircle the north and south poles. At the same time, some of the energy from these currents boosts oxygen atoms to high energies. These ions flow back up the magnetic field lines into space in polar plumes and become trapped in the ring current which flows above the equatorial regions of Earth. This current alters Earth's magnetic field near the ground where scientists using magnetometers can detect these changes easily.